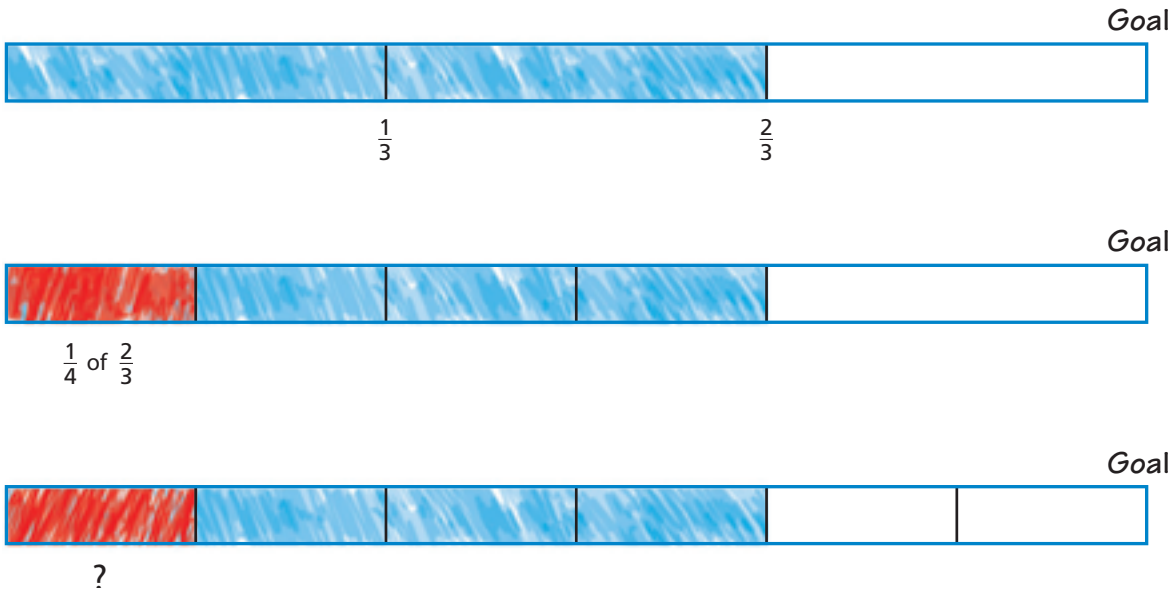
3.2 Finding a Part of a Part

TEKS / TAKS **6(11)B** Use a problem-solving model that incorporates understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness.

In *Bits and Pieces I*, you used thermometers to show what fraction of a fundraising goal had been met. These thermometers are like number lines. You mark thermometers in the same way you mark number lines to show parts of parts and to name the resulting piece. The fundraising thermometers can help you make sense of the number lines you will use in this problem.

One sixth-grade class raises $\frac{2}{3}$ of their goal in four days. They wonder what fraction of the goal they raise each day on average. To figure this out, they find $\frac{1}{4}$ of $\frac{2}{3}$. One student makes the drawings shown below:



Getting Ready for Problem 3.2

The student above divides the fraction of the goal $\left(\frac{2}{3}\right)$ that is met in four days into fourths to find the length equal to $\frac{1}{4}$ of $\frac{2}{3}$. To figure out the new length, the student divides the whole thermometer into pieces of the same size.

What part of the whole thermometer is $\frac{1}{4}$ of $\frac{2}{3}$?

How would you represent $\frac{1}{4} \times \frac{2}{3}$ on a number line?

How would you represent $\frac{3}{4} \times \frac{2}{3}$ on a number line?

Problem 3.2 Another Model for Multiplication

A. **1.** For parts (a)–(d), use estimation to decide if the product is greater than or less than $\frac{1}{2}$.

a. $\frac{1}{3} \times \frac{1}{2}$ **b.** $\frac{2}{3} \times \frac{1}{2}$ **c.** $\frac{1}{8} \times \frac{4}{5}$ **d.** $\frac{5}{6} \times \frac{3}{4}$

2. Solve parts (a)–(d) above. Use the brownie-pan model or the number-line model.

3. What patterns do you see in your work for parts (a)–(d)?

4. For part (b) above, do each of the following.

a. Write a word problem where it makes sense to use the brownie-pan model to solve the problem.

b. Write a word problem where it makes sense to use the number-line model to solve the problem.

B. Solve the following problems. Write a number sentence for each.

1. Seth runs $\frac{1}{4}$ of a $\frac{1}{2}$-mile relay race. How far does he run?

2. Mali owns $\frac{4}{5}$ of an acre of land. She uses $\frac{1}{3}$ of it for her dog kennel. How much of an acre is used for the kennel?

3. Blaine drives the machine that paints stripes along the highway. He plans to paint a stripe that is $\frac{9}{10}$ of a mile long. He is $\frac{2}{3}$ of the way done when he runs out of paint. How long is the stripe he painted?

C. What observations can you make from Questions A and B that help you write an algorithm for multiplying fractions?

D. Ian says, "When you multiply, the product is greater than each of the two numbers you are multiplying: $3 \times 5 = 15$, and 15 is greater than 3 and 5." Libby disagrees. She says, "When you multiply a fraction by a fraction, the product is less than each of the two fractions you multiplied." Who is correct and why?

ACE **Homework starts on page 40.**